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COMPARISON OF RECORDING PROPERTIES OF ME TAPE AND THIN MP TAPE WITH RESPECT TO OVERWRITE BEHAVIOUR

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Introduction

To meet the requirements in the DV system [1] there is an ongoing competition between MP and ME tape. Due to the double-coating technology (introduced by Fuji [2]) MP tape can produce an output level comparable with ME tape. Another point of interest is the overwrite behaviour. It has been reported [3] that the reduction in thickness in MP tape improves overwrite characteristics. In this paper we investigate whether a reduction in thickness of MP tape can account for a higher output as well as a better overwrite behaviour. Results obtained by measurements and modelling will illustrate our comparison.

Experiments

Two experimental MP tapes are used to look at the effects of thickness reduction. The comparison can be made because the magnetic data of the MP tapes are similar. These are: remanent magnetisation $M_r \approx 320$ kA/m, coercivity $H_c \approx 185$ kA/m, squareness $S \approx 0.9$, switching field distribution $SFD \approx 0.28$ and orientation factor $OF \approx 2.4$. The thick MP tape has a magnetic coating with thickness $\delta \approx 1.3$ μm, while the thin MP tape has a $\delta \approx 0.23$ μm. The ME tape used for comparison is a commercially available tape for the DV system. The data for this tape are: $M_r \approx 610$ kA/m, $H_c \approx 120$ kA/m and $\delta \approx 0.150$ μm [4]. In our recording set-up the rotation velocity of the drum was 1 m/s. We used a MIG head with a gap length $g \approx 0.25$ μm and the recording current was optimised for the output voltage at a wavelength $\lambda = 1$ μm.

Results

The frequency spectrum in Fig. 1 shows that the thin MP tape has a read-back voltage which is comparable with the output of the ME tape.

Two types of measurements are carried out for considering the overwrite behaviour of the tapes. In the first one the write wavelength λ_1 is varied (>1 μm) and the overwrite wavelength λ_2 is taken as 1 μm. In the other measurement the deep gap field H_0 is varied with fixed $\lambda_1 = 2$ μm and $\lambda_2 = 0.5$ μm (Fig. 2). Here λ_2 is the shortest wavelength used in the DV system. In both cases the thin MP tape did not show an improved overwrite behaviour compared with the thick MP tape for the available thicknesses in consistency with [5]. Overwrite properties of the ME tape were found to be superior.

In our simulations based on [6] MP tape is modelled. In this simulated tape the addition of an easy axis out of plane and changes with respect to the reversal mechanism are studied to follow the transformation from MP tape to ME tape-like characteristics. It has been noted previously [7] that overwrite varies linearly with $M_r\delta/H_c$ which scales with the transition parameter a. In the paper this computer experiment will be presented, showing that differences in easy axis and reversal mechanisms of MP and ME tape might explain a narrower PW_{50} for ME tape, corresponding with a smaller a, resulting in a better overwrite behaviour for ME tape.

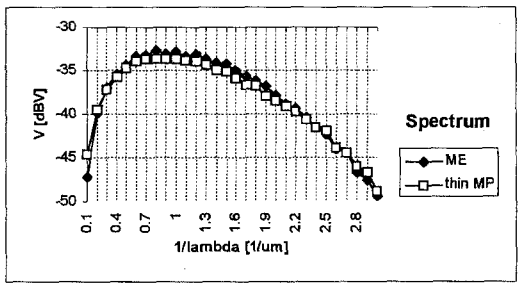

Fig.1 Read-back voltage vs inverse wavelength for thin MP and ME tape.

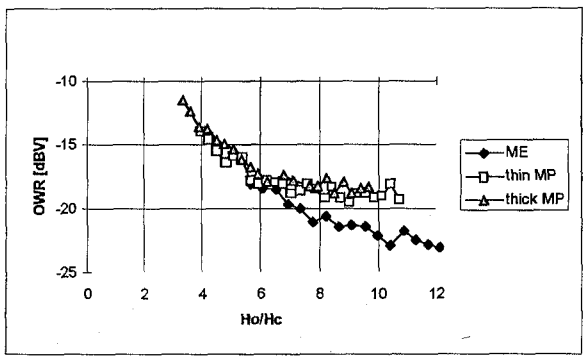

Fig. 2 Overwrite ratio (OWR) vs H_0/H_c

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